MASPS for ADS-B Rev. A

Tracking Information (committee secretary only)	
Change Issue Number	32
Submission Date	05/22/01
Status (open/closed/deferred)	Rev. A – CLOSED
Last Action Date	02/22/02

Short Title for Change Issue:	Revise capability code definition

MASPS Document Reference:		Originator Information:	
Entire document (y/n)		Name	James Maynard
Section number(s)	2.1.2.4	Phone	+1 (503) 391-3281
Paragraph number(s)		E-mail	james.maynard@at.ups.com jhm1jhm@teleport.com jhm1jhm@attglobal.net
Table/Figure number(s)		Other	Fax: +1 (503) 391-3882

	Proposed Rationale for Consideration (originator should check all that apply):		
x	Item needed to support of near-term MASPS/MOPS development		
	x	DO-260/ED-102 1090 MHz Link MOPS Rev A	
		ASA MASPS	
		TIS-B MASPS	
	x	UAT MOPS	
	Item needed to support applications that have well defined concept of operation		
		Has complete application description	
		Has initial validation via operational test/evaluation	
		Has supporting analysis, if candidate stressing application	
	Item needed for harmonization with international requirements		
	Item identified during recent ADS-B development activities and operational evaluations		
x	MASPS clarifications and correction item		
x	Validation/modification of questioned MASPS requirement item		
	Military use provision item		
	New requirement item (must be associated with traffic surveillance to support ASAS)		

Nature of Issue:		Editorial	x	Clarity		Performance		Functional

Issue Description:

The present definition of the "class codes" MS report element in section 2.1.2.4 indicates that this report element indicates the capability of a participant "to support engagement in specific operations," and lists a number of such specific operations, including "collision avoidance," "terminal station keeping," "free flight / cooperative separation in overflight," "oceanic cooperative separation," "simultaneous approaches," "blind taxi," and "runway incursion." This model for the structure of "class codes" seems to require a separate bit for each possible client application, with the set of bits turned on indicating the set of client applications that a transmitting ADS-B participant supports. But a transmitting participant does not necessarily know what will be the requirements of client applications running at different receiving ADS-B participants. It would be better to announce various capabilities of the transmitting participant rather than various applications that it supports.

Administrative Note: For further issue description, please refer to Issue Paper 23. Issue Paper 23 was CLOSED at the May 2001 WG6 meeting because it was determined that this Issue Paper will address all issues related to aircraft capabilities and available ADS-B application functionalities.

Originator's proposed resolution:

I propose that we rename the "class codes" MS report element as "capability codes" or "capability class codes," and that this report element should indicate particular capabilities, or related sets of capabilities, of the transmitting ADS-B participant.

The first "class code" listed in DO-242, §2.1.24, "no application capability," would be the default situation when none of the "capability class" bits are set.

The second "class code" listed in DO-242, §2.1.2.4, "CDTI based traffic display capability," indeed announces a particular capability of the transmitting participant, and is appropriate for inclusion as one of the "capability classes" to be encoded in this MS report element.

Another such capability that has been identified is whether the transmitting participant is equipped with an operating TCAS or ACAS system.

Other capability class codes may be identified and assigned later.

To avoid confusion, the various capabilities for which capability codes are to be assigned should not be assigned numbers in §2.1.2.4, but merely listed as bulleted items. (If an standardized report structure should be specified in the DO-242A MASPS, particular bits could be assigned in that report structure. But that should be the subject of a separate issue paper.)

I propose the following text for §2.1.2.4:

2.1.2.4 Capability Class Codes

Capability class codes are used to indicate the capabilities of a transmitting ADS-B participant, to permit client applications at a receiving ADS-B participant to assess whether data from the transmitting participant meets the requirements of those applications. Known specific capability class codes are listed below. However, this is not an exhaustive set and provision should be made for future expansion of available capability class codes, including appropriate combinations thereof.

- No application capability (e.g., broadcast only)
- CDTI based traffic display capability
- TCAS/ACAS installed and operational
- <other identified capabilities, or sets of related capabilities, to be inserted here>

May 24, 2001: The ad hoc group agreed that this Issue Paper will be addressed in Revision A of DO-242.

August 30, 2001: At the August WG6 meeting a proposal of incorporating permissible applications/services into capability classes was discussed. The group agreed that this was beyond what will be addressed for capability codes in DO-242A. It was agreed that Capability Codes would represent equipment capability and not aircraft and/or flight crew capabilities.

February 1, 2002: This Issue Paper's final resolution was approved by WG6 as part of the review of 242A-WP-11-01a. This Issue paper is now considered CLOSED and addressed in DO-242A.

The text found in Attachment A of this Issue Paper is from the final DO-242A draft delivered to RTCA on March 4, 2002. This text defines the capability codes within the Mode Status report andl replace subsection 2.1.2.4 "Class Code" from DO-242. Also shown is the row from the Mode Status Report Table which defines Capability Class Codes as a Mode Status Element.

2.1.2.10   Capability Class (CC) Codes

Capability class codes are used to indicate the capability of a participant to support engagement in various operations. Known specific capability class codes are lsted below. However, this is not an exhaustive set and provision should be made for future expansion of available class codes, including appropriate combinations thereof.

- CDTI based traffic display capability (§3.4.4.9.1)

- TCAS/ACAS installed and operational (§3.4.4.9.2)

- Service Level of the transmitting A/V (§3.4.4.9.3)

- ARV capability (§3.4.4.9.4)

- TS report capability (§3.4.4.9.5)

- TC report capability level (§3.4.4.9.6)

- Other capabilities, to be defined in later versions of this MASPS

Note: Capability Class (CC) codes are conveyed in the MS report (§3.4.4 below).

Table Error! Reference source not found.**: Mode -Status (MS) Report Definition.**

	MS Elem. #	Elements That Trigger Status Change Report			Reference Section	Notes
		Contents [Resolution or # of bits]				
CC, Capability Codes	7	Capability Class Codes [16 bits]			3.4.4.9	
		7a: CDTI display capability [1 bit]			3.4.4.9.1	
		7b: TCAS/ACAS installed and operational [1 bit]	•		3.4.4.9.2	
		7c: (Reserved for Service Level) [4 bits]			3.4.4.9.3	
		7d: TS report Capability Flag [1 bits]			3.4.4.9.5	
		7e: TC report Capability Level [2 bits]			3.4.4.9.6	
		(CC Codes reserved for future growth) [7 bits]			3.4.4.9.7	

3.4.4.9   Capability Class (CC) Codes Field

A transmitting ADS-B participant broadcasts Capability Class (CC) codes (§2.1.2.10) so as to indicate capabilities that may be of interest to other ADS-B participants. The subfields of the CC codes field are described in the following subparagraphs.

3.4.4.9.2   CDTI Traffic Display Capability

The CC code for "CDTI based traffic display capability" **shall** (R3.105-A) be set to ONE if the transmitting aircraft has the capability of displaying nearby traffic on a Cockpit Display of Traffic Information (CDTI). Otherwise, this CC code **shall** (R3.105-B) be ZERO.

3.4.4.9.2   TCAS/ACAS Installed and Operational

The CC code for "TCAS/ACAS installed and operational" **shall** (R3.106-A) be set to ONE if the transmitting aircraft is fitted with a TCAS II or ACAS computer and that computer is turned on and operating in a mode that can generate Resolution Advisory (RA) alerts. Otherwise, this CC code **shall** (R3.106-B) be ZERO.

Note: This field is also contained in the Status Change (SC) Report (§3.4.6). A change in the value of this field will trigger the transmission of messages supporting the SC report (§3.4.6.1).

3.4.4.9.3   Service Level of Transmitting A/V

At least four bits (sixteen possible encodings) **shall** (R3.107) be reserved in the capability class codes for the "service level" of the transmitting ADS-B participant. ADS-B equipment conforming to the current version of this MASPS (DO-242A) **shall** (R3.108) set the Service Level code to ZERO.

Note: When Service Levels are defined in the ASA MASPS, future versions of this MASPS will define Service Levels other than ZERO.

3.4.4.9.4   ARV Capability Flag

The ARV Capability Flag is a one-bit field that **shall** (R3.109) be encoded as in Table 3.4.4.9.4.

Table 3.4.4.9.4: ARV Capability Flag

ARV Capability Flag	Meaning
0	No capability for Air Reference Velocity Reports.
1	Capability of sending Air Reference Velocity Reports.

3.4.4.9.5   TS Report Capability Flag

The TS Report Capability Flag is a one-bit field that **shall** (R3.110) be encoded as in Table 3.4.4.9.5.

Table 3.4.4.9.5: TS Report Capability Flag

TS Report Capability Flag	Meaning
0	No capability for Target State Reports.
1	Capability of sending Target State Reports.

3.4.4.9.6   TC Report Capability Level

The TC Report Capability Level is a two-bit field that **shall** (R3.111) be encoded as in Table 3.4.4.9.6.

Table 3.4.4.9.6: TC Report Capability Levels

TC Report Capability Level	Meaning
0	No capability for Trajectory Change Reports
1	Capability of sending information for TC+0 report only.
2	Capability of sending information for multiple TC reports.
3	(Reserved for future use.)

3.4.4.9.7   Other Capability Codes

Other capability codes are expected to be defined in later versions of this MASPS.